84276

The Electric Field of a Moving Uncharged
Drop. 2. The Theory of the Electric Field
of a Drop Containing a Non-ionogenic
Surface-active Substance

S/069/60/022/005/007/0??
B015/B064

This holds for the steady motion of a drop, which is considered here
assuming a falling drop in an ion-free gas, whose motion is characterized
by Re ≪ 1. An equation (4) is derived for the potential difference at
both sides of the drop surface. Two limiting cases are studied: 1) The
rate of access of the molecules to the drop surface is determined by the
rate of the adsorption - desorption process; 2) the exchange rate of the
surface-active substance is determined by a low rate of access of the
substance from the interior of the drop to the surface, i.e., by the rate
of convective diffusion. In a two-phase adsorption film, the voltage
of the electric field may be several thousand volts/cm, while in single
phase films it is some orders of magnitude lower. There are 4 Soviet
references.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR Moskva
               (Institute of Physical Chemistry of the AS USSR Moscow)
SUBMITTED: December 2, 1959
Card 2/2

S/032/60/026/008/006 (
BO15/BO64

AUTHORS: Deryagin, B. V.   Lazarev, V. P. (Deceased)   Toporov, Yu.

TITLE: An Instrument for Studying the Static Friction of Polymers

PERIODICAL: Zavodskaya laboratoriya, 1960, Vol. 26, No. 8,
             pp. 1020-1021

TEXT: An instrument is described (Figs. 1, 2) that allows to measure the static friction coefficient of polymers under specific pressure loads up to 100-600 kg/cm^2. In principle, the instrument consists of a cylindrical envelope into which a cone is introduced. The sample is placed between envelope and cone in the form of a ring. Static friction is brought about by a slow rotation of the cone by means of an electric motor; the cone is loaded by means of a lever. The torque of the cone is determined with an oscilloscope and a strain gauge. The specific pressure of the cone on the ring-shaped sample is calculated from an equation, and the resulting value is introduced into the formula to compute the friction coefficient. There are 2 figures.

Inst. Phys. Chem. AS USSR

DERYAGIN, B.V.; DUKHIN, S.S.; LISICHENKO, V.A. (Moscow)

Kinetics of the attachment of mineral particles to bubbles in flotation. Part 2. Zhur. fiz. khim. 34 no.3:524-529 Mr '60.
(MIRA 13:11)

1. Kavkazskiy institut mineral'nogo syr'ya.
(Flotation) (Bubbles)

DERYAGIN, B.V.; SHUKAKIDZE, N.D.

Floatability of antimonite as a function of the zeta potential value. Dokl.AN SSSR 134 no.2:376-379 S '60.   (MIRA 13:9)

1. Institut fizicheskoy khimii Akademii nauk SSSR. 2. Chlen-korrespondent AN SSSR (for Deryagin).
(Stibnite)   (Flotation)

8/409

S/020/60/135/006/025/037
B004/B056

//.7410

AUTHORS: Deryagin, B. V., Corresponding Member AS USSR, Bakanov, S. P.,
              and Kurgin, Yu. S.

TITLE: The Influence of Monomolecular Layers Upon the Evaporation of
              Drops

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 135, No. 6,
              pp. 1417 - 1420

TEXT: The authors develop a theory of the influence of monomolecular
layers upon the evaporation of drops, which takes two effects into
account: 1) the quasi-steady evaporation of a drop covered by an insoluble
film of a different substance, and 2) the nonsteady evaporation of a drop
covered by such a film. For 1) the following is taken into account: a) the
steady diffusion of liquid molecules through the film, b) the steady
diffusion of liquid molecules from the film into the air. The following
relations are written for these processes: $C_1 = A_1/r + B_1$; $a < r < a + \delta$;
$C_2 = A_2/r + B_2$; $r > a + \delta + \lambda$. C_1 denotes the number of liquid molecules

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The Influence of Monomolecular Layers Upon   S/020/60/135/006/025/037
the Evaporation of Drops   B004/B056

per cm^3 of film, C_2 the concentration of vapor in the air, a the radius of
the drop, δ the thickness of the film, λ the thickness of the layer of air
immediately adjoining the film. A_1, A_2, B_1, B_2 are coefficients. On the
basis of the boundary conditions for diffusion on the boundaries $r = a + \delta$
and $r = a + \delta + \lambda$ the following relation is derived for a film ($\delta \ll a$):

$-dM/dt = 4\pi a^2 (C_o - C_\infty)/\left[C_o \delta / C_p D_1 + 1/(a\bar{v}/4) + a^2/(a + \lambda)D_2 \right]$ (10). dM/dt is

the change in mass of the drop per unit time, C_o is the saturation concen-
tration of vapor at the temperature of the drop, C_p is the concentration
of the liquid in the drop, C_∞ is the concentration of vapor at an
infinite distance from the drop, α is the permeability coefficient of the
film, D_1 is the diffusion coefficient of the liquid in the film, D_2 is
the diffusion coefficient of vapor in air, and $\bar{v}$ is the average velocity
of the vapor molecules. For the case $C_o \delta / C_p D_1 + 1/(a\bar{v}/4) < 1/(\alpha_{H_2O}\bar{v}/4)$,

where $\alpha_{H_2O} = 0.034$ is the condensation coefficient of water, there results
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The Influence of Monomolecular Layers Upon   S/020/60/135/006/025/037
the Evaporation of Drops   B004/B056

an acceleration of evaporation by the presence of the monomolecular layer
This case was experimentally observed. For nonsteady evaporation, the

authors proceed from the equation $-dM/dt = m4\pi(a + \lambda)^2(-D_2\partial C/\partial r|_{r=a+\lambda})$, and

derive a very voluminous equation. For the initial evaporation rate,

$J|_{t=0} = J_0[1 + (\bar{v}/4)a^2/D_2(a + \lambda)]$ is given. J_0 corresponds to the quasi-
steady state of equation (10). On the basis of the experimental values of
J_0 and $J_{t=0}$, the parameters α and δ/CD_1 may be calculated for each film.
There are 7 references: 4 Soviet and 3 US.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of
             Physical Chemistry of the Academy of Sciences USSR)

SUBMITTED: July 14, 1960

Card 3/3

DERYAGIN, Boris Vladimirovich; FAYNBOYM, I.E., red.; SAVCHENKO, Ye.V., tekhn.red.;

[Aerosols; smokes and fogs] Aerozoli; dymy i tumany. Moskva, Izd-vo "Znenie," 1961. 30 p. (Vsesoiuznoe obshchestvo po rasprostraneniiu politicheskikh i nauchnykh znanii. Ser.9, Fizika i khimiia, no.3). (MIRA 14:3)

1.Chlen-korrespondent AN SSSR (for Deryagin).
          (Aerosols)

DERYAGIN, Boris V.

    "The capillary effects of the second kind."

To be submitted for the Gordon Reaserch Conference, Chemistry at Interfaces, Meriden, N.H.
24-27 July 1961.

Head of the Laboratory of Surface Forces, Institute of Physical Chemistry, Academy of
Sciences USSR.

DERYAGIN, B.V

PHASE I BOOK EXPLOITATION   SOV/5590

Konferentsiya po poverkhnostnym silam. Moscow, 1960.

Issledovaniya v oblasti poverkhnostnykh sil; sbornik dokladov na
   konferentsii po poverkhnostnym silam, aprel' 1960 g.   (Studies
   in the Field of Surface Forces; Collection of Reports of the
   Conference on Surface Forces, Held in April 1960) Moscow, Izd-
   vo AN SSSR, 1961.   231 p.   Errata printed on the inside of back
   cover. 2500 copies printed.

Sponsoring Agency: Institut fizicheskoy khimii Akademii nauk SSSR.

Resp. Ed.:   B. V. Deryagin, Corresponding Member, Academy of Sciences
   USSR; Editorial Board: N. N. Zakhavayeva, N. A. Krotova, M. M.
   Kusakov, S. V. Nerpin, P. S. Prokhorov, M. V. Talayev and G. I.
   Fuks; Ed. of Publishing House: A. L. Bankvitser; Tech. Ed.:
   Yu. V. Rylina.

PURPOSE:.. This book is intended for physical chemists.

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Studies in the Field of Surface Forces (Cont.)   SOV/5590

COVERAGE: This is a collection of 25 articles in physical chemistry
on problems of surface phenomena investigated at or in associa-
tion with the Laboratory of Surface Phenomena of the Institute
of Physical Chemistry of the Academy of Sciences USSR. The first
article provides a detailed chronological account of the Labora-
tory's work from the day of its establishment in 1935 to the
present time. The remaining articles discuss general surface
force problems, polymer adhesion, surface forces in thin liquid
layers, surface phenomena in dispersed systems, and surface forces
in aerosols. Names of scientists who have been or are now associ-
ated with the Laboratory of Surface Phenomena are listed with
references to their past and present associations. Each article
is accompanied by references.

TABLE OF CONTENTS:

Zakhavayeva, N. N. Twenty-Five Years of the Laboratory of
Surface Phenomena of the IFKhAN SSSR (Institute of Physical
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Studies in the Field of Surface Forces (Cont.)   SOV/5590

I. GENERAL PROBLEMS OF SURFACE FORCES

II. POLYMER ADHESION

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Studies in the Field of Surface Forces (Cont.)   SOV/5590

III. SURFACE FORCES IN THIN LAYERS OF LIQUIDS

Card 5/8

Studies in the Field of Surface Forces (Cont.)   SOV/5590

Deryagin, B. V., P. S. Prokhorov, M. V. Velichko, L. F.
Leonov. New Method For Obtaining Constant and Homogenous
Supersaturations   216

Martynov, G. A., S. P. Bakanov. On the Solution of a
Kinetic Equation of Coagulation   220

AVAILABLE: Library of Congress

Card 8/8   JA/rsm/os
                                                 10/28/61

PHASE I BOOK EXPLOITATION   SOV/5221

Deryagin, Boris Vladimirovich, Corresponding Member, Academy of Sciences USSR

Aerozoli; dymy i tumany (Aerosols; Smoke and Fog) Moscow, Izd-vo "Znaniye,"
   1961. 27,000 copies printed. (Series: Vsesoyuznoye obshchestvo po
   rasprostraneniyu politicheskikh i nauchnykh znaniy. Seriya IX, 1961:
   Fizika i khimiya, no. 3)

Ed.: I.B. Faynboym; Tech. Ed.: Ye.V. Savchenko.

PURPOSE: This booklet is intended for the general reader.

COVERAGE: The author discusses the nature of aerosols and describes optical and
   other methods used in studying the particles which comprise them. He discusses
   the laws which govern the formation of aerosol systems, their aging, and sub-
   sequent disintegration. The use of aerosols in agriculture(pest control), and
   in medicine are outlined. There are 12 references, all Soviet.

Card 1/2

DERYAGIN, B.V.; LEVI, S.M.

       In connection with G.M.Tsvetkov's letter "Some problems in the
emulsion coating of the film base." Zhur.nauch.i prikl. fot. i
kin. 6 no.2:160 Mr-Ap '61.   (MIRA 14:4)
          (Photographic emulsions)   (Tsvetkov, G.M.)

DERYAGIN, B.V.; SHCHERBAKOV, L.M.

Effect of surface forces on phase equilibria of polymolecular
layers and on the adsorption contact angle. Koll. zhur. 23
no.1:40-52 Ja-F '61.

(MIRA 17:2)

1. Institut fizicheskoy khimii AN SSSR, Moskva i Tul'skiy
mekhanicheskiy institut.

S/069/61/023/001/004/009
B020/B056

AUTHORS: Deryagin, B. V., Dukhin, S. S., and Korotkova, A. A.

TITLE: Diffusiophoresis in electrolyte solutions and its role in the mechanism of film formation from rubber latices by the method of ion deposition

PERIODICAL: Kolloidnyy zhurnal, v. 23, no. 1, 1961, 53-58

TEXT: The equation for the diffusiophoresis in a non-electrolyte solution (Ref. 1), obtained by simple generalization, is transformed for the case of an electrolyte in the form

$$v^D = \left[(z^- \mid z^+ \mathfrak{f}^-)/\eta)\right] c \, \text{degree} \quad \mu \approx \left[(z^- \mathfrak{f}^+ + z^+ \mathfrak{f}^-)/\eta\right] RT \, \text{degreec} \quad (1),$$

where η is the viscosity, c is the molecular concentration of the electrolyte, $c = c^+/z^- = c^-/z^+$, μ is the chemical potential; R is the universal gas constant, T - absolute temperature, z^+ and z^- are the electrovalences of the ions:

$$\mathfrak{f}^+ = (1/c_0^+) \int_0^\infty \gamma^+ h \, dh, \quad \mathfrak{f}^- = (1/c^-) \int_0^\infty \gamma^- h \, dh,$$

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Diffusiophoresis in electrolyte ...

and γ^+ the excess value of the concentration of cations and anions at the distance h from the sliding plane compared to the volume and c^+ and c^- the concentration of cations and anions, respectively, of the solution. The resulting rate of the diffusiophoresis of latex particles is

$$\vec{v} = \vec{v}_E + \vec{v}_D = (RT/\eta)\, D_{eff}\left[(z^-\gamma^+/D^+) + (z^+\gamma^-/D^-)\right]\ \text{degreec} \qquad (5),$$

where $D_{eff} = \left[D^+D^-(z^+ + z^-)\right]/(z^+D^+ + z^-D^-)$ (D^+ and D^- are the diffusion coefficients of the positive and negative ions). In order to determine the distribution of an electrolyte diffusing from a flat fixator layer of thickness h into the semispace, the problem of non-steady diffusion of the electrolyte into the unbounded space from a 2h thick layer is dealt with. The functions $c'(x,t)$ and $c(x,t)$, (x is the distance from the symmetry plane which coincides with the central plane of the fixator layer; t is the time from the beginning of the process) are satisfied, besides by the equations

$$\partial c'/\partial t = D'_{eff}\ (\partial^2 c'/\partial x^2),\quad \partial c/\partial t = D_{eff}\ (\partial^2 c/\partial x^2),$$

where D'_{eff} is the diffusion coefficient of the electrolyte in the fixator,

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Diffusiophoresis in electrolyte ...

also by the intial and boundary conditions
$c'(x,t)\big|_{f=0} = c_0, c(x,t)_{t=0} = c_1$ (6) and $c'(x,t)\big|_{x=\pm h} = c(x,t)_{x=\pm h}$,
$D'_{eff}(\partial c'/\partial x)(x,t)_{x=\pm h} = D_{eff}(\partial c/\partial x)\cdot(x,t)_{x=\pm h}$ (7). When using the
solution of the analogous heat problem concerning the solidification of
the liquid layer, the relation

$$c(x,t) = c_0 + (c_1 - c_0)\frac{(D'_{eff}/D_{eff})^{1/2}}{1+(D'_{eff}/D_{eff})^{1/2}}\left[erfc\frac{x-h}{2(D_{eff}t)^{1/2}} - \right.$$

$$\left. -(1-\varkappa)\sum_{n-1}^{\infty}(-\varkappa)^{n+1}erfc\frac{x-h+2nh(D'_{eff}/D_{eff})^{1/2}}{2(D_{eff}t)^{1/2}}\right].\qquad (8)$$

is obtained, where $\varkappa = \left[1 - (D'_{eff}/D_{eff})^{1/2}\right] / \left[1 + (D'_{eff}/D_{eff})\right]^{1/2}$.
For the rate of diffusiophoresis, the equation

$$v(x,t) = \frac{dx}{dt} = -\frac{A}{2\sqrt{D_{eff}t}}\left[e^{-\frac{(x-h)^2}{4D_{eff}t}} - \right.$$

$$\left. -(1+\varkappa)\sum_{j}^{\infty}(\varkappa)^{n+1}e^{-\frac{[x-h+2nh(D'_{eff}/D_{eff})^{1/2}]^2}{4D_{eff}t}}\right],\qquad (9)$$

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Diffusiophoresis in electrolyte ...

is obtained, where

$$A = \frac{2\,(c_0 - c_1)\,RT\,(D'_{eff}D_{eff})^{1/2}D_{eff}}{\sqrt{\pi}\,\eta\,[1 + (D'_{eff}/D_{eff})^{1/2}]}\left(\frac{z^-\xi^+}{D^+} + \frac{z^+\xi^-}{D^-}\right);\qquad (10)$$

A depends on c via ξ^+ and ξ^-. For the surface density $\Gamma(t)$ of the precipitated latex layer as dependent on time, the relation

$$\Gamma(t) = \rho_0\,(x_0(t) - h) = \rho_0 4k_0\,(D_{eff}t)^{1/2} =$$

$$= \frac{2\rho_0 RT}{\eta}\left(\frac{z^-\xi^+}{D^+} + \frac{z^+\xi^-}{D^-}\right)(c_0 - c_1)\frac{(D'_{eff}t)^{1/2}}{(\pi)^{1/2}\,[1 + (D'_{eff}/D_{eff})^{1/2}]},\qquad (23)$$

is obtained, where c_1 is the initial concentration of the latex. Finally, relations are given for the rate of ion deposition $\Gamma(t)$ directly by means of the potential

Diffusiophoresis in electrolyte ...

$$\Gamma(t) = \frac{p_0 \varepsilon (c_0 - c_1)(kT)^2 (D'_{eff} t)^{1/2}}{\pi^{3/2} \eta c_0 z^2 e^2 [1 + (D'_{eff}/D_{eff})^{1/2}]} \left\{ \frac{\ln [1 + \exp(-ze\zeta/2kT)]/2}{D^+} + \right.$$

$$\left. + \frac{\ln [1 + \exp(ze\zeta/2kT)]/2}{D^-} \right\}, \quad (z^+ = z^- = z) \qquad (A)$$

$$\Gamma(t) = \frac{p_0 \xi \zeta kT (c_0 - c_1)(D^+ - D^-)(D'_{eff} t)^{1/2}}{2\pi^{3/2} \eta e c_0 (z^+ + z^-) D^+ D^- [1 + D'_{eff}/D_{eff})^{1/2}]}, \quad (|\zeta| < 25 \; \text{мв})$$

$$\Gamma(t) = \frac{e p_0 kT (c_0 - c_1) \zeta (D'_{eff} t)^{1/2}}{2\pi^{3/2} \eta e c_0 z^2 - D^- [1 + (D'_{eff}/D_{eff})^{1/2}]}, \quad (\zeta \gg 25 \; \text{мв}) \qquad (B)$$

$$\Gamma(t) = \frac{e p_0 kT (c_0 - c_1) \zeta (D'_{eff} t)^{1/2}}{2\pi^{3/2} \eta e c_0 z^+ D^+ [1 + (D'_{eff}/D_{eff})^{1/2}]}, \quad (-\zeta \gg 25 \; \text{мв})$$

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Diffusiophoresis in electrolyte ...

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B020/B056

wherever this is possible. A. N. Frumkin is mentioned. There are
4 Soviet-bloc references.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR, Moskva (Institute of
               Physical Chemistry of the AS USSR, Moscow)

SUBMITTED: July 12, 1960

S/069/61/023/001/008/009
B124/204

AUTHORS: Deryagin, B. V. and Toporov, Yu. P.

TITLE: Methods of studying the frictional properties of polymers
             under conditions of strong one-sided compression

PERIODICAL: Kolloidnyy zhurnal, v. 23, no. 1, 1961, 118-121

TEXT: The authors suggest simple methods of studying the friction of
substances in the case of strong unidirectional compression by means of a
simple device, which is schematically shown in Fig. 1. It consists of
two hand screw-presses upon the same base plate. The first, vertical press
serves for producing normal stresses at the contact point of the samples,
which was tested for friction. The second press with its axis perpendicular
to the first serves for attaining a relative shift of the contacting
samples. The possible schemes of testing by means of this device are given
in Fig. 2. When using scheme A. the free sample (a plate of that material,
whose friction with the polymer is tested) is pressed between two polymer
plates 1 and 3 which cannot be moved in the horizontal plane. This scheme
may be used also when both plates are made of the same material. This

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Methods of studying the ...

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B124/204

scheme serves the investigation of dry and boundary friction of polymers
in order to study the behavior of the boundary layers of polymers at a
solid surface. Scheme 5 may be used in tests with higher pressures. In
this case, the immovable plates 3 have holes, into which the rods 1 and 4
of the tested material are placed, with the surface of the emerging part
of the rods being pressed to the surface of the free plate 2. The contact
is loaded by the piston which is adjusted upon the guide poles 4 by means
of screw 19 which is turned by hand at the lever 18. The magnitude of the
horizontal force whose maximum is equal to the frictional force F at the
moment the samples begin to slide, is measured with the help of the de-
formation of the dynamometric ring 7. A ПОБ 14 (POB14) oscilloscope and
a ГБIII (GBIII) galvanometer are used as measuring instruments. The
friction coefficient (μ) is calculated from the equation $\mu = F/2N$. A
second method is based upon wedging in by a cone which is placed in a
conical opening. The device concerned (Fig. 3) was developed by V. P.
Lazarev; it consists of an exchangeable conical metal sample 8 upon pole 2;
the sample was placed into a conical opening of the massive thick-walled
socket 9 which consists of an organic glass and is fixed to the base
plate. Fig. 3 shows the annular sample 10 which is loaded by a vertical

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force. The cone is fastened in the socket by a Teflon bearing (11).
Axial pressure upon the cone is exerted by the lever 4 and transferred to
the pole over the ball-and-socket support 3. In the investigation of the
frictional properties during turning of the loaded sample in the socket,
a special removable head 1, mounted co-axially with the socket upon the
ball-bearing, is used. The arrangement is turned by the lever 5.
There are 4 figures.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR, Moskva (Institute of
              Physical Chemistry, AS USSR, Moscow)

SUBMITTED: January 19, 1960

Card 3/3

S/069/61/023/002/007/008
B101/B208

AUTHORS: Deryagin, B. V., Churakov, V. V., and Vlasenko, G. Ya.

TITLE: Flow ultramicroscope with automatic count of aerosol
                particles/

PERIODICAL: Kolloidnyy zhurnal, v. 23, no. 2, 1961, 234-237

TEXT: The dust content of air is measured with a flow microscope by visual
observation of the dust particles flashing up in the light. The visual
observation is, however, tiresome. The present paper therefore describes
an automatic counting device. Fig. 2 presents the scheme of this apparatus
which uses a ВДК (VDK) ultramicroscope. The aerosol is sucked into
cuvette (1), and passes through the illuminated zone (2). The light scat-
tered by the aerosol particles is focused by objective (3) to the cathode
(4) of an ФЭУ-19 (FEU-19) photomultiplier which is at a distance of 500 mm.
In front of the photomultiplier there is a rotary diaphragm (5) with
apertures of 0.5, 1.5, 7.5, and 30 mm diameter for adapting the light
intensity to the aerosol concentration. If the apparatus is remote-control-
led, (5) may be mounted on a БД-404А (BD-404A) selsyn motor (6) which is

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S/069/61/023/002/007/008
B101/B208

Flow ultramicroscope ...

driven by selsyn motor (7). A 75-w and 10-v lamp of the type K-21 ($Л_1$ in Fig. 2) was used as light source. The optical discriminator (8) with 5 apertures containing neutral gray glass filters of different densities was used for subdivision of the particle size. (8) is fastened on the axis of a C43 (SChZ) telephone relay (9). The latter operates when the contact is closed on disk (10). Simultaneously, the two-way cock (11) on the axis of (10) is opened or closed. (10) and (11) are driven by electric motor (14) (15-20 w). The other end of the motor shaft drives air pump (15) which produces a partial vacuum of 20-30 mm Hg. When (11) is open, the aerosol is sucked in. When (11) is closed, (15) is connected with (1) via capillary (12) and U tube (13), the change of the liquid level in (13) being equal to the aerosol volume sucked through (1). The voltage of the photomultiplier is increased by pulse amplifier (16) and conveyed to mechanical counter (17). In order to be independent of voltage fluctuations in power supply, the photomultiplier is fed by ГБ-300 (GB-300) batteries. The aerosol concentration is calculated from the following equation: $N = na/V$ (N = number of particles in 1 cm^3, n = number of particles obtained by the counter, V = volume (cm^3) of aerosol sucked through the cuvette, a = constant for the corresponding aperture of the rotary diaphragm). This device allows to

Flow ultramicroscope ...   S/069/61/023/002/007/008.
                                             B101/B208

measure aerosol concentrations between $10-10^7$ particles per cm^3 without dilu-
tion. It records particles of a diameter from 10^{-5} to $20 \cdot 10^{-4}$ cm approxi-
mately. Determination of aerosol concentration and division into five frac-
tions according to particle size takes 7-12 min. A. Ye. Mikirov and
A. G. Laktionov are mentioned. There are 3 figures, 1 table, and 6 refer-
ences: 5 Soviet-bloc and 1 non-Soviet-bloc. The reference to English-
language publication reads as follows: F. T. Gucker, C. T. O'Konski, J. Amer.
Chem. Soc., 69, 2422, 1947.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR, Laboratoriya
              poverkhnostnykh yavleniy (Institute of Physical Chemistry of
              the AS USSR, Laboratory of Surface Phenomena)

SUBMITTED: April 28, 1960

Card 3/3

DERYAGIN, B.V.; BAKANOV, S.P.

Concerning priority in the development of the theory of
diffusiophoresis and thermophoresis of small aerosol particles.
Koll.zhur. 23 no.4:505-507 Jl-Ag '61.   (MIRA 14:8)

1.   Institut fizicheskoy khimii AN SSSR, Moskva.
                    (Aerosols)

DERYAGIN, B.V.; GORODETSKAYA, A.V.; TITIYEVSKAYA, A.S.; YASHIN, V.N.

> Disjoining pressure of electrolyte solutions on polarized
> mercury. Koll.zhur. 23 no.5:535-543 S-O '61.   (MIRA 14:9)
>
> 1. Institut fizicheskoy khimii AN SSSR i Laboratoriya pover-
> khnostnykh yavleniy, Moskva.
> (Electrolyte solutions) (Films (Chemistry))
> (Electrocapillary phenomena)

DERYAGIN, B.V.; ZIMON, A.D.

Adhesion of powder particles to plane surfaces. Koll.zhur.
23 no.5:544-552 S-O '61.
(Powder film) (Adhesion)   (MIRA 14:9)

S/076/61/035/006/005/013
B110/B220

AUTHORS: Dukhin, S. S. and Deryagin, B. V. (Moscow)

TITLE: Kinetics of mineral particle attachment to bubbles in
flotation IV. Retardation by surface-active substances and
, distribution on the bubble

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 6, 1961, 1246 - 1257

·TEXT: When determining the surface mobility of bubbles and the distribu-
tion of flotation agents the retardation by the ionogenic adsorption layer
of a surface-active substance has to be taken into account. Moreover, the
retardation is important for calculating the Dorn effect and the bubble
electrophoresis, for the determination of low concentrations, and after
corresponding modification for Hg drops and polarography. According to
V. G. Levich (Fiziko-khimicheskaya gidrodinamika (Physicochemical hydro-
dynamics), Izd-vo AN SSSR, M. 1952) $v_r^{(0)} = u_0(1-a^3/r^3) \cos \Theta,$

$v_\Theta^{(0)} = u_0(1+a^3/r^3) \sin \Theta$ (1) holds for bubbles without surface-active

substances in all liquids. For the tangential stress $\tau \left.\dfrac{\cdot v_\Theta}{\cdot r}\right|_{r=a} = 0.$ (2)

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the following equation holds: $\vec{v}(r,\theta) = \vec{v}^{(0)} + \vec{v}^{1}$ (3), wherein $\vec{v}^{1}$ = deviation from the velocity of the ideal liquid. The following condition is assumed: $|\vec{v}^{1}| \ll |\vec{v}^{(0)}|$ (7). The tangential stress (2) is in equilibrium with the gradient of the surface tension in the presence of surface-active substances: $\eta \frac{\partial v_{\theta}}{\partial r}\Big|_{r=a} = \frac{1}{a}\frac{\partial \sigma}{\partial \theta}$ (8). (1), (2), and (8) result in:

$$\eta \frac{\partial v'_{\theta}}{\partial r}\Big|_{r=a} = \frac{1}{a}\frac{\partial \sigma}{\partial \Gamma}\frac{\partial \Gamma}{\partial \theta} + \frac{3}{2}\eta \frac{u_o}{a} \sin \theta \qquad (9).$$

If $v_{\theta}(a,\theta) = v_{\theta}^{(0)}(a,\theta) + v'_{\theta}(a,\theta)$,

$$v'_{\theta}(a,\theta) = \frac{3}{2}u_0 \sin\theta \div \frac{3}{4}\frac{u_0}{\sin\theta}\left(\frac{3}{\pi Re}\right)^{1/3}\left(1 + \frac{2RT\delta\Gamma_0^2}{\eta aDc_0}\right) \int_0^{1-\cos\theta} \frac{[1-(z-1)^2]^{1/3}dz}{[1-\cos\theta-z]^{1/3}}. \qquad (13)$$

is obtained. $\Gamma_0/c_0 \ll \delta \sim 10^{-4}$ cm (14)

is assumed to be a condition for low surface activity,

$\Gamma_0/c_0 \gg \delta$ (15) for high surface activity.

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Eq.

$$v_0'(a, \theta) = \frac{3}{2} u_0 \sin \theta + \frac{1}{\sin \theta \sqrt{6\pi Pe}} \left[\frac{3}{2} u_0 J_1(\theta) + \frac{RT c_0 a}{n \sqrt{3\pi Pe}} J_2(\theta) \right]. \quad (25)$$

holds for the velocity distribution, in the integrals: Eqs.

$$J_1(\theta) = \int_0^{1-\cos\theta} \frac{[1 - (z-1)^2]^{1/2}}{[1 - \cos\theta - z]^{1/2}} dz \quad (25a)$$

$$J_2(\theta) = \int_0^{1-\cos\theta} \frac{4-z}{(2-z)^{1/2}(1-\cos\theta - z)^{1/2}} \left(\frac{z}{3-z} \right)^{1/2} dz \quad (25b)$$

being calculated numerically (Figs. 1 and 2). The second component of
(13) is the correction of the velocity distribution due to the existence
of an adsorbed substance on the bubble surface. Figs. 1 and 2 show the
steep rise of the retardation effect with increasing Θ, i. e., on approach-
ing the rear of the bubble. It has to be studied, whether the equations
hold for this zone. With a velocity distribution according to Eq. (13)
the retardation effect is low in: Eq.

$$K = \frac{2RT\Gamma_0}{\eta a D} \frac{\Gamma_0}{c_0} \delta \ll 1. \quad (27),$$

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where K = relative decrease of velocity due to the retardation effected by the reagents in the rear zone, where $v'(a,\theta) \sim u_0 \sin\theta$. The concentrations satisfying (27) have but a slight influence on the position of the shedding, which is determined by $v_\theta'(a,\theta) \sim u_0 \sin\theta$ (28). Their velocity distribution is nearly that of an ideal liquid circulating around a solid sphere and the surfactants have practically no influence on the hydrodynamic proper- ties of the bubble. The influence of the reagents on the point of shedding begins at "critical" concentrations satisfying $K(c_0) \sim 1$ (29). Retardation outside the rear zone is slight as long as $K(c_0) \ll Re^{1/2}$ (30). (13) and (28) do not hold for $\theta > \theta_1$. For $\theta \sim \theta_1$ and somewhat lower θ values (13) does not hold, since (7) is not satisfied. (28) holds the better, the nearer $\theta = \pi$. If (30) is satisfied, (28) holds. The part of the bubble surface, where intense retardation at $\theta \sim \theta_1$ changes into a slight one at $\theta \leq \theta_1 - \Delta\theta$, is situated above the zone of shedding. For θ_1 near π satisfying condi- tion (30): $\Delta\theta \ll \theta_1$. For concentrations satisfying (30) θ_1 and the narrow transition range $(\Delta\theta \ll \theta_1)$ may be indicated approximately and the

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retardation may be neglected in the main zone of the bubble $(\theta < \theta_1 - \Delta\theta)$. With increasing concentrations the shedding is moved to the equator, the transition zone expands and the zone of low tension disappears. For $Da \sim 10^{-7}$ cm^3/sec, $\Gamma_o/c_o \sim 3 \cdot 10^{-5}$ cm (according to (14)) and $\delta \sim 10^{-4}$ cm the concentration effecting the shift of the shedding line is $5 \cdot 10^{-4}$ gmole/l according to (29), which corresponds to the concentrations of xanthogenate used in industrial flotation. Since these correspond to (14), they have no retardation effect on the bubble surface. In the zone $\theta \cdot \pi$, $J_2(\theta)$ grows more rapidly than $J_1(\theta)$. The comparison of the components of, (25) is only of use, if $\theta < \theta_{1p}$, where θ_{1p} = position of the shedding lines in pure liquid. The "critical" concentration, where a shift of the shedding lines begins, is:

$$c_{np} \sim \frac{9\pi\eta u_o^2}{(2vD)^{\frac{1}{2}}RT} \frac{\sin^3\theta_{1p}}{J_3(\theta_{1p})} .$$

(31)

With $c_o > c_{kp}$ the shedding lines are shifted to the zone $\theta < \theta_{1p}$. Since in

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this case the first component of (25) is larger than the second,

$$\frac{J_1(\theta_1)}{\sin^4 \theta_1} \sim \frac{9\pi u_0^2}{(2\nu D)^{1/2}} \frac{\eta}{RT c_0} \qquad (32a)$$

holds which after transformation has the form

$$\frac{J_2(\theta_1)}{J_2(\theta_{1p})} \frac{\sin^3 \theta_{1p}}{\sin^2 \theta_1} \sim \frac{c_{up}}{c_0} . \qquad (33)$$

The bubble surface consists of: (A) shedding zone, (B) zone of transition, and (C) zone of slight retardation. Since (25) applies only for (C), it has to be defined more exactly: If (7) holds the retardation in (C) may be described by comparing the third and first components of (13) and (25). In case (14) it is $f_1(\theta) = J_1(\theta)/\sin^2\theta$, in case (15) $f_2(\theta) = J_2(\theta)/\sin^2\theta$ (Figs. 1 and 2). The difference between the two amounts to 4 powers of ten, e. g. for (14): $c_{kp} = 10^{-3}$gmole/l, for (15): $c_{kp} = 10^{-7}$gmole/l. In (14) the shedding line is shifted from the rear to the equator at concentrations from c_{kp} to $Re\, c_{kp}$, i. e. for an increase in concentration by 1

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power of ten. In (15) the increase in concentration must be 4 powers of ten. Since for θ = 90-170° $f_2(\theta)$ decreases more rapidly than $f_1(\theta)$, with decreasing θ the zone $\theta < \theta_1$ is less retardated in (15). For $0 < \theta < 90°$ $f_2(\theta)$ decreases slowly. Thus, the shift of the shedding line to the equator effects an intensive retardation also in the case of (15). For (14) the retardation process can be described quantitatively by (25) merely in the zone of slight retardation. Moreover, the vortex shedding from the rear zone has to be taken into account. So the velocity distribution on circulation around a sphere (Reynolds number = 157,000) is potential for $0 < \theta < 50°$, but quite differing for $\theta > 60°$. In the range of the Reynolds number of $5 \cdot 10^2 - 10^5$ the resistance of a solid sphere does not alter, which indicates inalterability of the shedding lines ($\theta = 81°$, when Re=10^5), since the resistance is determined by the shedding. If (7) is satisfied (13) and (25) hold at the most for $\theta < 50°$, if the shedding lines at $\theta > 135°$ are rather distant from the equator. If the shedding zone is small, the zone of the angles is large, where the velocity distribution differs but slightly from (1). There are 2 figures and 7 Soviet-bloc references.

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ASSOCIATION: Akademiya Nauk SSSR Institut fizicheskoy khimii (Academy of Sciences, USSR, Institute of Physical Chemistry), Kavkazskiy institut mineral'nogog syr'ya (Kavkaz Institute of Mineral Raw Material)

SUBMITTED: September 17, 1959

Card 8/8

DUKHIN, S.S.; DERYAGIN, B.V, (Moskva)

Kinetics of the attachment of mineral particles to bubbles
in flotation. Part 5: Motion of the bubble surface considerably
retarded by a dissolved surface active agent; distribution of
the surface active substance and the electric field of the
bubble. Zhur. fiz. khim. 35 no.7:1453-1457 Jl '61.

(MIRA 14:7)

1. Kavkazskiy institut mineral'nogo syr'ya.
(Bubbles)   (Surface chemistry)

25477
S/020/61/139/001/009/018
B104/B231

24.4300

AUTHORS: Bakanov, S. P., and Deryagin, B. V., Corresponding Member of
                 the AS USSR

TITLE: State of a gas moving in the neighborhood of a solid surface

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 139, no. 1, 1961, 71 - 74

TEXT: For the purpose of investigating an even gas flow, bounded on one
side by a wall, the authors apply methods developed by E. P. Gross et al.
(Ann. of Phys. (USA), 1, 141 (1957); Phys. of Fluids, 1, 215 (1958). For
reasons of simplicity, diffuse reflection from the wall is assumed as gas-
kinetic boundary condition. The distribution function of the gas molecules
in the boundary layer satisfies the Boltzmann equation, and is found as

follows: $f = f_0 \left[1 + \Phi(\vec{c}, x) \right]$ (1). $\vec{c} = (m/2kT)^{1/2}\vec{v}$; $\vec{v}$ stands for the
velocity of a molecule, m for its mass; T is the absolute temperature, x
the perpendicular distance of the molecule from the wall.
$f_0 = n(m/2\pi kT)^{3/2}\exp(-c^2)$. The correction Φ in the steady state is found

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by solving the equation $c_x \partial \Phi/\partial x = J(\Phi)$ (2) where $J(\Phi)$ is the collision integral. The gas outside the boundary layer displays a Chapman-Enskog distribution which can be put down as follows:

$f = f_0(1 + mv_z q_z/kT - b_1 mv_z v_x \partial q_z/2kTn\partial x)$. q_z stands here for the center-of-mass velocity of the gas, n for the number of molecules per unit volume, b_1 for a constant that depends on the interaction of gas molecules. As regards solid spheres the following applies: $b_1 = \frac{5}{4}\sqrt{\pi}n\lambda(m/2kT)^{1/2}$. Two suitable distribution functions are introduced for f:

$f(\vec{v},x) = f^+(\vec{v},x) + f^-(\vec{v},x)$ for $v_x \langle 0$ and $v_x \rangle 0$, respectively; $f^+ = 0$ for $v_x \langle 0$, and vice versa. By introducing the denotation $u_z(x) = (m/2kT)^{1/2}q_z(x)$, $1 = \frac{5}{4}\sqrt{\pi}\lambda$ and transition to dimensionless velocities the author obtains as boundary condition:

$$\Phi^-(\vec{c},d) = 2c_z u_z(d) - 1c_x c_z \frac{\partial u_z}{\partial x}(d), \quad \Phi^+(\vec{c},0) = 0 \quad (3)$$

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and the solution of (2) with the boundary conditions (3) is subsequently found in the form $\Phi_{\pm}(\vec{c},x) = a_o^{\pm}(x)c_z + a_1^{\pm}(c_x c_z)$ (3) is satisfied on the condition that $a_o^+(0) = 0$, $a_1^+(0) = 0$, $a_o^-(d) = 2u_z(d)$, $a_1^-(d) = -1\partial u_z(d)/\partial x$. Thus Φ can be expressed by

$$\Phi = \Phi^+ \cdot \frac{1+\text{sign}\, c_x}{2} + \Phi^- \frac{1-\text{sign}\, c_x}{2} =$$

$$= \left(\frac{a_o^+ + a_o^-}{2} + \frac{a_1^+ + a_1^-}{2} c_x \right) c_z + \left(\frac{a_o^+ - a_o^-}{2} + \frac{a_1^+ - a_1^-}{2} c_x \right) c_z \,\text{sign}\, c_x. \quad (6)$$

and, since $J(\Phi)$ is a linear operator the following applies

$$J(\Phi) = \frac{a_o^+ + a_o^-}{2} J(c_z) + \frac{a_1^+ + a_1^-}{2} J(c_x c_z) +$$

$$+ \frac{a_o^+ - a_o^-}{2} J(c_z \,\text{sign}\, c_x) + \frac{a_1^+ - a_1^-}{2} + J(c_x c_z \,\text{sign}\, c_x). \quad (7)$$

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In addition,

$$\frac{d}{dx}\left(\pm a_0^{\pm} + a_1^{\pm} \frac{\sqrt{\pi}}{2}\right) = \pm \frac{a_1^+ + a_1^-}{\pi} I_2 \pm \frac{a_0^+ - a_0^-}{\pi} I_1,$$

$$\frac{d}{dx}\left(a_0^{\pm} \frac{\sqrt{\pi}}{2} \pm a_1^{\pm}\right) = \frac{a_0^+ - a_0^-}{\pi} I_2 + \frac{a_1^+ + a_1^-}{\pi} I_3 \pm \frac{a_1^+ - a_1^-}{\pi} I_4. \tag{8}$$

where

$$I_1 = \int_{-\infty}^{\infty} c_z \; \text{sign} \; c_x \; J \; (c_z \; \text{sign} \; c_x) \; e^{-c^2} \vec{dc}, \qquad I_2 = \int_{-\infty}^{\infty} c_z \; \text{sign} \; c_z J \; (c_x c_z) \; e^{-c^2} \vec{dc},$$

$$\tag{9}$$

$$I_3 = \int_{-\infty}^{\infty} c_x c_z J \; (c_x c_z) \; e^{-c^2} \vec{dc}, \qquad I_4 = \int_{-\infty}^{\infty} c_x c_z \; \text{sign} \; c_z J \; (c_x c_z \; \text{sign} \; c_x) \; e^{-c^2} \vec{dc}.$$

is obtained for the determination of $a_0^{\pm}(x)$ and $a_1^{\pm}(x)$. Further similar expressions are vanishing. If the kind of molecule interaction is given, integrals (9) can be computed. For solid spheres the author obtains:

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$$I_2 = -\frac{4}{5\sqrt{\pi}}\frac{\pi}{\lambda} \approx -0.452\frac{\pi}{\lambda}, \quad I_3 = -0.4\frac{\pi}{\lambda}, \text{ and, furthermore,}$$

$$a_0^+ = l\frac{\partial u}{\partial x}(d)\left(2\frac{x}{l} + \frac{B}{C}e^{-\alpha x} - \frac{B}{C}\right),$$

$$a_0^- = l\frac{\partial u}{\partial x}(d)\left(2\frac{x}{l} + \frac{A}{C}e^{-\alpha x} - \frac{B}{C}\right), \tag{17}$$

$$a_1^+ = l\frac{\partial u}{\partial x}(d)(e^{-\alpha x} - 1), \quad a_1^- = l\frac{\partial u}{\partial x}(d)\left(-\frac{D}{C}e^{-\alpha x} - 1\right).$$

$$q(x) = \frac{1}{n}\int_{-\infty}^{\infty} v_x \vec{f}d\vec{v} = \frac{1}{8}\bar{v}\left[\sqrt{\pi}(a_0^+ + a_0^-) + (a_1^+ - a_1^-)\right], \tag{18}$$

is obtained for the velocity profile of the gas near the wall, where
$\bar{v} = (8kT/\pi m)^{1/2}$. Substituting (17) into (18) finally results in

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$$q(x) = \frac{1}{8}\overline{v}l\frac{\partial u}{\partial x}\left[\sqrt{\pi}\left(4\frac{x}{l} - 2\frac{B}{C} + \frac{A+B}{C}e^{-\alpha x}\right) + \left(1 + \frac{D}{C}\right)e^{-\alpha x}\right] =$$

$$= \frac{2\eta}{\pi\rho v}\frac{\partial q}{\partial x}\;(d)\left[\sqrt{\pi}\left(4\frac{x}{l} - 2\frac{B}{C}\right) + \left(\frac{A+B}{C}\sqrt{\pi} + 1 + \frac{D}{C}\right)e^{-\alpha x}\right].$$ (A)

while

$$p_{xz}^{+}(x) = -\frac{1}{2}\eta\frac{\partial q}{\partial x}\left[1 - \frac{B_1(\pi - 2)}{\alpha\sqrt{\pi} + \pi B_1}e^{-\alpha x}\right],$$

$$p_{xz}^{-}(x) = -\frac{1}{2}\eta\frac{\partial q}{\partial x}\left[1 + \frac{B_1(\pi - 2)}{\alpha\sqrt{\pi} + \pi B_1}e^{-\alpha x}\right].$$ (B)

is obtained for the pulse components. The denotations used in these
equations are as follows: $A = \alpha\sqrt{\pi} - 4B_1$; $B = -\alpha\sqrt{\pi} - 4B_1$; $C = 2(\alpha + B_1\sqrt{\pi})$;
$D = 2(-\alpha + B_1\sqrt{\pi})$; $A_1 = (I_1 - \frac{1}{2}\sqrt{\pi}I_2)/(1 - \pi/4)\pi$; $B_1 = (I_2 - \frac{1}{2}\sqrt{\pi}I_1)/\pi(1-\pi/4)$;
$A_2 = (I_2 - \frac{1}{2}\sqrt{\pi}I_3)/\pi(1 - \pi/4)$; $B_2 = (I_3 - \frac{1}{2}\sqrt{\pi}I_2)/\pi(1 - \pi/4)$;
$A_3 = \frac{1}{2}\sqrt{\pi}I_4/\pi(1 - \pi/4)$; $B_3 = I_4/\pi(1 - \pi/4)$.
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State of a gas moving in the...   B104/B231

There are 4 references: 1 Soviet-bloc and 3 non-Soviet-bloc.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute
of Physical Chemistry, Academy of Sciences USSR)

SUBMITTED: March 25, 1961

Card 7/7

DERYAGIN, B.V.; BAKANOV, S.P.

Theory of gas sliding along a solid surface under the effect of
temperature drop. Dokl. AN SSSR 141 no.2:384-386 N '61.
(MIRA 14:11)

1. Chlen-korrespondent AN SSSR (for Deryagin).
(Gas flow)

DERYAGIN, Boris V.

"The role of electric double layer in the phenomena of adhesion of solid bodies"

Reports to be submitted for the Gordon Research Conferences, Section on Adhesion, 27-31 Aug 1962, New Hampton, N. H.

Institute of Physical Chemistry, Academy of Sciences USSR

DERYAGIN, Boris Vladimirovich; BAKANOV, S. P.

"Present state of the theory of thermophores and diffusiophoresis
of aerosol particles"
To be presented at the First National Conference on Aerosols -
Liblice, Czechoslovakia, 8-13 Oct 1962.

Inst. of Physical Chemistry, Acad. of Sci. USSR, Moscow (

S/062/63/000/002/007/020
B144/B186

AUTHORS: Voropayeva, T. N., Deryagin, B. V., and Kabanov, B. N.

TITLE: Determination of the points of zero charge by the method of crossed polarized metallic threads

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye khimicheskikh nauk, no. 2, 1963, 257 - 263

TEXT: A new direct method is described for determining the points of zero charge in metals by measuring the force barrier preventing the contact of two polarized metal threads in an electrolyte. Two threads of Pt, Au, or Fe, 200 - 300 μ in diameter, were mounted orthogonally in a vessel in such a way that they could be brought into contact with the aid of a d-c motor. The vessel was partly filled with an electrolyte (KCl, $MgSO_4$, H_2SO_4). The metal threads could be polarized separately to any given potential by two Pt electrodes. The potential was measured using calomel with KCl solutions, and $Hg-Hg_2SO_4$ with $MgSO_4$ and H_2SO_4 solutions as reference electrodes. The potential difference of 0.01 v between the two threads was nullified at the moment of contact and the two threads were separated again automatically. Card 1/2

Determination of the points....

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The angle of rotation was measured with a photorelay. The value of the force barrier was recorded on an electronic potentiometer at the moment of contact. The points of zero charge correspond to the minimum or zero values of this force barrier, as is shown by measurements at different potentials. The force barrier determined for Pt threads in KCl solution showed a distinct minimum at 0.20 ± 0.01 v in 0.001 KCl, which became flatter in 0.01 KCl and disappeared completely in 0.1 N KCl. The electrolytes used with gold threads were 10^{-3} N KCl and $3 \cdot 10^{-4}$ N $La(NO_3)_3$. In both cases the minimum was observed at 0.05 v. For Fe threads, the minimum of the force barrier in 10^{-2} N NaOH (Fe is passive) was at 0.34 v, in $3 \cdot 10^{-3}$ N and 10^{-2} N HCl (Fe is active) at -0.4 v. There are 9 figures and 1 table.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry of the Academy of Sciences USSR)

SUBMITTED: May 14, 1962

Card 2/2

CC/C04/CC2/CC5

AUTHOR: Deryagin, B.V., Corresponding Member (See Association)

TITLE: The electromagnetic nature of molecular forces

PERIODICAL: Priroda, no. 4, 1962, 17-26

TEXT: The author, together with I.V. Abrikosova, and the molecular attraction between solid bodies in the Laboratorija rkhnostnykh yavleniy (Laboratory of Surface Phenomena) of the Institut f eskoy khimii AN SSSR (Institute of Physical Chemistry of the AS USSR). .B. Leyb helped greatly in developing the measuring technique. The measurements were made for quartz - quartz, thallium halide - thallium halide, and chrome - quartz on a special instrument whose operation is described and illustrated. The molecular attraction was found from the magnitude of current required to counteract it. The results of the measurements are given. The fact that the measurements coincide with the calculations of Ye.M. Lifshits, based on the spectral properties of the molecules, confirms the theoretical work of London and Kazimir as well as the electromagnetic nature of molecular at-

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The electromagnetic nature ...

traction.   There are 9 figures.

ASSOCIATION: AN SSSR

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Card 2/2

DERYAGIN, B.V.; SAMYGIN, V.D.

> One of the reasons of slime particles' inability to float.
> Sbor. nauch. trud. Gintsvetmeta no.19:240-254 '62.
>
> (MIRA 16:7)
>
> (Flotation)

S/170/62/005/005/010/015
B104/B102

AUTHORS: Deryagin, B. V., Zakhavayeva, N. N., Andreyev, S. V.

TITLE: The laminar flow of high-molecular liquids and their solu-
             tions

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, v. 5, no. 5, 1962, 92 - 95

TEXT: This is a survey of the authors' papers on a method for investiga-
ting thin films of liquids flowing on a solid and for studying their
properties, devised in the laboratoriya poverkhnostnykh yavleniy IFKh
AN SSSR (Laboratory of Surface Effects IFKh AS USSR), (cf. e.g. Deryagin
et al. DAN SSSR, 4, 101, 1955). There are 2 figures.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR, Moscow   (Institute
              of Physical Chemistry AS USSR, Moscow)

SUBMITTED: August 7, 1961

Card 1/1

28127

S/020/62/144/003/012/030
B102/B108

24.5300

AUTHORS: Deryagin, B. V., Corresponding Member AS USSR, and Bakanov, S.P.

TITLE: Theory of thermomolecular pressure drop and of thermo-osmosis
of gases in wide capillaries

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 144, no. 3, 1962, 535-537

TEXT: Within the framework of the thermodynamics of irreversible processes
the authors study the possible causes of the inconsistency of the theory of
thermomechanical effects (Maxwell, Phil. Trans. Roy. Soc., 170, p. 1,231,
1879; Epstein, Zs. Phys., 54, 539, 1929) and the experimental results.
The Poiseuille gas current through a cylindrical tube is considered,
assuming that the main part of heat is transferred not in the layer near
the wall but in the bulk of the gas. This assumption is based on results of
earlier studies (DAN, 141, No. 2, 1961). The system considered consists
of two vessels connected by a wide tube with the differences Δp and ΔT
between its ends. The flows of mass and heat are then

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Theory of thermomolecular pressure ...

$$I_M = - L_{11} \frac{\Delta p}{\rho T} - L_{12} \frac{\Delta T}{T^2} ,$$

(2)

$$I_Q = - L_{21} \frac{\Delta p}{\rho T} - L_{22} \frac{\Delta T}{T^2}$$

with $\Delta p/\Delta T = -I_Q/I_M \big|_T$ (ρ/T). $I_Q\big|_T$ is the flow of heat at constant temperature, which can be set equal to $(3/2)\eta \nu \pi r^2 \overrightarrow{\Delta v}$, and $\overrightarrow{\Delta v} = (1/\eta)$ grad p (Navier-Stokes) if the gas is incompressible and thought to consist of elastic balls. η denotes the dynamic viscosity of the gas. The heat transfer in the layer near the wall is $I_Q'\big|_T = k \nu \pi r^2$ grad p, $k = 0.0218...$, so that the total heat transferred in the gas is $I_Q\big|_T + I_Q'\big|_T = 1.52 \nu \pi r^2$ grad p.

The flow of mass is $I_M\big|_T = (-\pi r^4/8\nu)$ grad p, so that

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Theory of thermomolecular pressure ...   S/020/62/144/003/012/030
B102/B108

$$\frac{\Delta p}{\Delta T} = \frac{12.2\eta\nu}{r^2 T} = 12.2\frac{\eta^2 R}{pMr^2}$$ (9)

M is the molecular weight and R the gas constant. This formula describes
the sought thermomolecular effect in wide capillaries. If the temperature
dependence of η is taken into account, this relation agrees with
experimental results. There is 1 figure.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of
Physical Chemistry of the Academy of Sciences, USSR)

SUBMITTED: February 28, 1962

Card 3/3

DERYAGIN, B.V.; MARTYNOV, G.A.

Wedging pressure of a gas film. Dokl.AN SSSR 144 no.4:825-
828 Je '62.   (MIRA 15:5)

1. Institut fizicheskoy khimii AN SSSR. 2. Chlen-korrespondent
AN SSSR (for Deryagin).
        (Films (Chemistry))   (Gases)

42946

S/020/62/147/001/019/022
B101/B144

27.4070

AUTHORS: Deryagin, B. V., Corresponding Member AS USSR, Bakanov, S. P.

TITLE: Theory of the thermophoresis of large solid aerosol particles

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 147, no. 1, 1962, 139 - 142

TEXT: On the basis of the thermodynamics of irreversible processes, the rate of thermophoresis of an aerosol particle is studied for the case $R \gg \lambda$ where R is the particle radius, λ is the mean free path of the gas molecules flowing around the particle under isothermal conditions. The material flow is $I_M|_p = (\varrho/T)Q|_T \Delta T/\Delta p$, from which $v = (Q|_T/T)\Delta T/\Delta p$ is obtained. To calculate $Q|_T$ it is assumed that a spherical particle is flown around by the gas at small Reynolds numbers. According to Chapman-Enskog, and allowing for the Navier-Stokes relations, the following expression is obtained: $Q = (3/2)(\eta/\varrho)dp/dr$ where $Q_r|_{r=R} = (9/2)(\eta^2/\varrho R^2)(\vec{u} \cdot \vec{r})$. $\vec{u}$ is the gas velocity at infinity, $\vec{r_0}$ is the unit vector in the direction $\vec{r}$. $T_i = -(\vec{\alpha} \cdot \vec{r})/2\varkappa_e + \varkappa_i)$ $= (\vec{\alpha} \cdot \vec{r_0})$ holds for the surface of the sphere.

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Theory of the thermophoresis...   S/020/62/147/001/019/022
                                               B101/B144

holds for the temperature distribution within the sphere. Outside the sphere $T_e = -(\vec{2r})/(2\varkappa_e + \varkappa_i)$ where $\varkappa_i$ is the thermal conductivity of the sphere, $\varkappa_e$ that of the gas. If $\varkappa_i \gg \varkappa_e$, then according to P. Epstein (Zs. Phys., 54, 537 (1929)) $Q_{iT} = -(\eta/2\varrho)\overline{dp}/dz$ from which it follows that $v = \bullet(\eta/2\varrho T)\overline{dT}/dz$. If $\varkappa_i$ is of the same order of magnitude as $\varkappa_e$, the velocity of thermophoresis is expressed by

$v_T = \left[(4\varkappa_e + 0.5\varkappa_i)/(2\varkappa_e + \varkappa_i)\right](\eta/\varrho T)dT/dz$. The experimental data are better expressed by this equation than by that of P. Epstein. It also explains the experimentally observed dependence of $\varrho v_T/\eta$ on the nature of the gas. There is 1 figure.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of
               Physical Chemistry of the Academy of Sciences USSR)

SUBMITTED: July 20, 1962

Card 2/2

42707

S/020/62/147/002/017/021
B101/B186   / 7

26 /420

AUTHORS: Deryagin, B. V., Corresponding Member AS USSR, Fedyakin, N. N.

TITLE: Special properties and viscosity of liquids condensed in
            capillaries

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 147, no. 2, 1962, 403-406

TEXT: In a paper by the second author (Koll. zhurn., 24, 497 (1962)) it
was reported that the water column in sealed capillaries gradually
shortened and that a second water column formed having different properties
from those of the original water. Such water columns with special
properties can also be prepared in open capillaries if the relative
humidity exceeds 93%. Here the viscosity of such secondary liquid columns
was measured. For this purpose, a difference of pressure was generated
at the ends of the capillary tube, the movement of the column was observed
through a microscope at constant temperature, the velocity was determined
as a function of the pressure difference, and the viscosity was then
calculated by Poiseuille's equation. The experiments were made with ~ 1 mm
long columns of water, acetone, or methanol in capillaries of $\sim 1\,\mu$ radius.

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Special properties and viscosity...   S/020/62/147/002/017/021
                                                   B101/B186

It was found that after repeated movements of the column its velocity increased, i.e., the viscosity of the liquid decreased; after three or four movements it approached the normal value. The faster the movement of the liquid column the faster the viscosity dropped. As long as the normal value is not reached, the initial anomalous viscosity value might be restored after long standing. A limit shear stress $\theta' = 2$ dynes/cm^2 was calculated for water. The viscosity $\eta \cdot 10^2$ g/cm·sec of water in a capillary tube of 1.06 μ radius was 12.5 in the first movement and 1.2 in the second. For acetone, $\eta_1 = 0.52$; $\eta_2 = 0.34$ (capillary radius 1.4 μ). For methanol, the viscosity did not change, but a limit shear stress was found which disappeared as soon as the column had moved about 1 mm. Conclusions: In glass capillaries at equal temperature, two modifications of water can exist which differ in viscosity, thermal expansion, saturated vapor pressure, etc. These modifications are due to thickenings of the liquid layer adsorbed on the capillary walls with the help of the hydroxyl groups on the glass surface. Densely packed molecular chains connected by H bonds are formed. The anomalous structure can be restored as long as the destruction of these H bonds by flowing does not exceed a certain degree.

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Special properties and viscosity...   S/020/62/147/002/017/021
                                          B101/B186

The occurrence of liquids with anomalous structure accounts for the fact
that Kelvin's equation does not hold for capillary condensation, and
determines the behavior of water in soil and porous substances. There
are 4 figures and 1 table.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute
              of Physical Chemistry of the Academy of Sciences USSR)

SUBMITTED: June 2, 1962

Card 3/3

S/020/62/147/004/012/027
B117/B186

AUTHORS: Deryagin, B. V., Corresponding Member AS USSR, Talayev, M. V., Zakhavayeva, N. N.

TITLE: Experimental study on the filtration of rarefied air through porous media in the Knudsen and transition regions of pressure

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 147, no. 4, 1962, 819-821

TEXT: The filtration of rarefied air in a special unit was studied to confirm the assumption that the gas consumption, as a function of pressure and concentration, must have a minimum. Substances such as pressed cotton, glass filters, cardboard etc. with a porosity coefficient $\delta = 0.4-0.9$ placed in a cylindrical bulb, were used as filters. After a vacuum of 10^{-2} mm Hg was reached, evacuation was continued to $10^{-3}-10^{-4}$ mm Hg by a steady air flow through the filter. The gas consumption and pressure were measured. Using very porous substances $(\delta = 0.8-0.9)$ and a pressure at which the free path of molecules is of the same order of magnitude as the diameter of pores, the gas consumption

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Experimental study on the...   S/020/62/147/004/012/027
                                                 B117/B186

as a function of pressure snowed a minimum that corresponds to the pseudo-
molecular flow conditions. In the region of molecular flow, the gas
consumption becomes independent of the mean pressure. With less porous
substances ($\delta < 0.7$), the direction suddenly changes from the horizontal
into a rising curve which corresponds to the viscous flow. With very porous
substances ($\delta \geqslant 0.8$) a transition region exists. The curve bends sharply
toward the pseudo-molecular flow. After reaching a minimum it again rises
linearly and corresponds to a viscous flow. There are 3 figures.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute
               of Physical Chemistry of the Academy of Sciences USSR)

SUBMITTED: July 19, 1962

Card 2/2

S/020/62/146/006/013/016
B107/B186

AUTHORS: Deryagin, B. V., Corresponding Member AS USSR, Toporov, Yu. P.

TITLE: Applicability of a two-term law of friction to the frictional
             properties of polymers

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 146, no. 6, 1962, 1356-1359

TEXT: The dependence of the specific force of friction on the specific
pressure was examined for the following pairs of materials: ШХ -15 (ShKh-15)
- Teflon (Figs. 1 and 2), steel - polyethylene (Fig. 1), steel - polyamide
(Fig. 1), steel - tread rubber (Fig. 3), and steel - uncompounded rubber
(Fig. 4). The device and the method adopted for this purpose, as previous-
ly described in detail (B. V. Deryagin, Yu. P. Toporov, Koll. zhurn., v.23,
118 (1961)), made it possible to apply specific pressures of up to 1
1000 kg/cm^2. The purpose of this work was to find out whether Deryagin's
formula (Zs. f. Phys., v. 88, 661 (1934)) is valid also for the pairs of
materials mentioned above: $F = \mu N + \rho pS$, where F is the external force of
friction; N is the perpendicular load; μ is the true coefficient of fric-

Card 1/4

Applicability of a two-term ...

S/020/62/146/006/013/016
B107/B186

tion; S is the true contact area; and p is the specific molecular adhesion. The results (Figs. 1 - 4) lead to the conclusion that the perpendicular load acts on the force of friction not only indirectly through the true contact area, as assumed by Terzaghi (K. Terzaghi, Erdbaumechanik, Wien, 1925) and Bowden (F. P. Bowden, D. Tabor, Friction and Lubrication of Solids, Oxford, 1954), but also directly according to Deryagin's two-term formula. The curvature of the graph for polyethylene (Fig. 1) is ascribed to the fact that a first effect of the increasing perpendicular load is to enlarge the true contact area. There are 4 figures and 13 references: 10 soviet, 3 non-soviet.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry of the Academy of Sciences USSR)

SUBMITTED: June 30, 1962

Card 2/2

DERYAGIN, B.V. (Moskva)

Theory of depositing a viscuous liquid on a fiber or wire extracted
from it. PMTF no.3:71-78 My-Je '63.   (MIRA 16:9)

1. Institut fizicheskoy khimii AN SSSR.
                    (Hydrodynamics)

KUDRYAVTSEVA, N.M.; DERYAGIN, B.V.

Laboratory apparatus for measuring particle concentration and dispersion composition of hydrosols and olesols. Koll.zhur. 25 no.6:
739-741 N-D '63.   (MIRA 17:1)

1. Institut fizicheskoy khimii AN SSSR, Moskva.

DERYAGIN, B.V.; ZAKHAVAYEVA, N.N.; TALAYEV, M.V.

Determining the specific surface of powders and porous bodies.
Vest.AN SSSR 33 no.2:80-81 F '63.   (MIRA 16:2)
            (Surface measurement)   (Porous materials)

MARTYNOV, G.A.; DERYAGIN, B.V.

Electrical double layer in fused salts and concentrated electrolyte solutions. Dokl. AN SSSR 152 no.1:140-142 S '63. (MIRA 16:9)

1. Laboratoriya poverkhnostnykh yavleniy Instituta fizicheskoy khimii AN SSSR. 2. Chlen-korrespondent AN SSSR (for Deryagin).
(Fused salts--Electric properties)
(Electrolyte solutions)

DERYAGIN, B.V.; AL'TSHULER, M.A.

On the capillary impregnation of spherical granules and diffusion
extraction while in the stage of capillary impregnation. Dokl.
AN SSSR 152 no.3:651-654 S '63.   (MIRA 16:12)

1. Institut fizicheskoy khimii AN SSSR.   2. Chlen-korrespondent
AN SSSR (for Deryagin).

DERYAGIN, B.V.; AL'TSHULER, M.A.

Effect of the physicochemical properties of entrapped gases on the impregnation of porous bodies. Dokl. AN SSSR. 152 no.4: 911-914 O '63.   (MIRA 16:11)

1. Institut fizicheskoy khimii AN SSSR. 2. Chlen-korrespondent AN SSSR (for Deryagin).

DERYAGIN, B.V.; SMILGA, V.P.

Effect of the electromagnetic delay of molecular attraction on
the coagulation concentrations of electrolytes. Dokl. AN SSSR
153 no.2:377-378 N '63.   (MIRA 16:12)

1. Institut fizicheskoy khimii AN SSSR. 2. Chlen-korrespondent
AN SSSR (for Deryagin).

GRIN-KELLI, D.; DERYAGIN, B.V.

Birefrigence of thin liquid layers. Dokl. A^N SSSR 153 no.3:
638-641 N '63.   (MIRA 17:1)

1. Laboratoriya poverkhnostnykh yavleniy Instituta fizi-
cheskoy khimii AN SSSR i Rotamstedskaya opytnaya stantsiya,
Angliya. 2. Chlen-korrespondent AN SSSR (for Deryagin).

DERYAGIN, B.V.; GUTOP, Yu.V.

Theory of fluctuation rupture of wetting films and its
application to the kinetics of flotation sticking. Dokl.
AN SSSR 153 no.4:859-862 D '63.   (MIRA 17:1)

1. Institut fizicheskoy khimii AN SSSR. 2. Chlen-korrespondent
AN SSSR (for Deryagin).

DERYAGIN, B.V., otv. red.; CHER VYTIV, K.N., red.; E KLTES, G.A.,
        red.; MOROZOVA, L. . ., red.; TEP .J/T'CH, N.N., red.;
        BARKVITSER, '.L., red.

[Studies in the field of surface forces] Issledovaniia v
oblasti poverkhnostnykh sil; sbornik dokladov. Moskva,
Nauka, 1964. 202 p.   (MIRA 17:10)

1. Konferentsiya po poverkhnostnym silam, Institut fiziche-
skoy khimii Akademii nauk SSSR. 2d, 1962. 2. Chlen-korres-
pondent AN SSSR (for Deryagin).

S/0303/64/000/004/0062/0064

ACCESSION NR: AP4043824

AUTHOR: Deryagin, B. V., Toporov, Yu. P., Tomfel'd, I. N., Aleynikova, I. N., Parfanovich, B. N.

TITLE: Compressed air adhesion gauge

SOURCE: Lakokrasochny*ye materialy* i ikh primeneniye, no. 4, 1964, 62-64

TOPIC TAGS: organic coating, film adhesion, powder deposit adhesion, organic film adhesion, compressed air adhesion gauge, adhesion gauge design, adhesion gauge

ABSTRACT: The report describes a compressed air adhesion gauge based on the principles of the May, Smith and Snow (Nature, 179, 494, 1957) method, designed by the authors to measure adhesion of organic film and powder deposit coatings to solid surfaces. The instrument consists of a high-pressure chamber (receiver, 0-150 atm) and a low-pressure chamber (thick-walled barrel, inside diameter = 22.4 mm), separated by a suitable membrane. A cylindrical projectile is propelled by compressed air when the membrane is pierced and impacts on a disk of high-strength heat treated steel. The resultant inertia produces separation of an organic coating deposited on the projectile face (target has center aperture with diam. = 15 mm) or a powder coating deposited on the external surface of the target (solid disk). Described modifications allow tests in air,

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ACCESSION NR: AP4043824

vacuum or any gas medium. Adhesion strength is determined as the minimal velocity of a projectile which results in separation of the coating. Orig. art. has: 2 illustrations.

ASSOCIATION: None

SUBMITTED: 00   ENCL: 00

SUB CODE: IE, MT   NO REF SOV: 005   OTHER: 005

Card   2/2

DERYAGIN, B.V.; KURGIN, Yu.S.

Effect of periodic pressure oscillations on phase equilibrium.
Part 1: Liquid - vapor, a plane interface. Koll.zhur. 26 no.1:
28-35 Ja-F '64.   (MIRA 17:4)

1. Institut fizicheskoy khimii AN SSSR, Moskva.

DERYAGIN, B.V.; KUDRYAVTSEVA, N.M.

Coagulation kinetics of hydrophobic colloids studies with the aid of a flow ultramicroscope. Koll.zhur. 26 no.1:61-66 Ja-F '64.
(MIRA 17:4)

1. Institut fizicheskoy khimii AN SSSR.

DERYAGIN, B.V.; SAMYGIN, V.D.; LIVSHITS, A.K.

Flocculation of mineral particles under turbulent conditions.
Part 1: Mechanism of flocculation. Koll.zhur. 26 no.2:179-185
Mr-Ap '64.   (MIRA 17:4)

1. Nauchno-issledovatel'skiy institut tsvetnykh metallov, Moskva.

KURGIN, Yu.S.; DERYAGIN, B.V.

Effect of periodic pressure fluctuations on phase equilibrium.
Part 2: Liquid – vapor – drop phase equilibrium; experimental
applications. Koll.zhur. 26 no.2:215-223 Mr-Ap '64.

(MIRA 17:4)

1. Institut fizicheskoy khimii AN SSSR i Laboratoriya
poverkhnostnykh yavleniy, Moskva.

DERYAGIN, B.V.; NERPIN, S.V.; CHURAYEV, N.V.

Theory of vaporization of liquids from capillaries. Koll. zhur.
26 no.3:301-307 My-Je '64   (MIRA 17:9)

1. Institut fizicheskoy khimii AN SSSR, Moskva, Agrofizicheskiy
institut, Leningrad i Kalinskiy torfyanoy institut.

ACCESSION NR: AP4037181   8/0069/64/026/003/0394/0395

AUTHOR: Deryagin, B. V.; Toporov, Yu. P.; Aleynikova, I. N.

TITLE: Evaluation of the strength of adhesion of spherical dielectric particles to metal surfaces

SOURCE: Kolloidny*y zhurnal, v. 26, no. 3, 1964, 394-395

TOPIC TAGS: dust removal, 10 micron particle size, adhesive force, ultracentrifuge, glass dust adhesive force, adhesiometer, centrifugal force

ABSTRACT: The knowledge of such adhesive force is required for thoroughly removing dust from solid bodies. This is particularly important for particles of less than 5-10 microns, since centrifugal force will not completely remove such size. The relative adhesive number (ratio of removed particles to initial adhesive number) is thus a basic adhesion characteristic. Glass-23 spheres and polymer powder, with a particle size less than 5-10 micron, were used as test material, and a UTs-P-A ultracentrifuge as equipment. The measuring equipment and procedure are described. The powder was placed on the rotor. It was shown that no complete dust removal could be obtained at the acceleration maximum of 3×10^5 g for glass, and much lower

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ACCESSION NR: AP4037181

acceleration for the polymer, since the rotor heated up. The adhesive force of the glass thus exceeded 3.10^{-3} dyne. This method has other disadvantages since it does not permit adhesion measurements under various conditions (humidity, temperature, etc.). Additional vibrators were of no avail. At present tests are conducted for removing dust through acceleration by impact with good preliminary results. A pneumatic adhesiometer was also devised. Orig. art. has: no figures.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR, Moskva (Institute of Physical Chemistry, Academy of Sciences, SSSR)

SUBMITTED: 03Dec63   DATE ACQ: 09Jun64   ENCL: 00

SUB CODE: GC   NO REF SOV: 001   OTHER: 002

Card 2/2

DERYAGIN, B.V.; STOROZHILOVA, A.I.

Thermophoresis of aerosol particles in laminar flow by the jet method. Koll. zhur. 26 no.5:583-588 S-O '64.

(MIRA 17:10)

1. Institut fizicheskoy khimii AN SSSR, Moskva.

DERYAGIN, B.V.; SMILGA, V.P.

Effect of electromagnetic lag on the coagulating concentrations
of electrolytes. Koll. zhur. 26 no.5:589-591 S-O '64.
(MIRA 17:10)

1. Institut fizicheskoy khimii AN SSSR, Moskva.

DERYAGIN, B.V.; RABINOVICH, Ya.I.

Experimental verification of the theory of thermophoresis of small aerosol particles. Koll. zhur. 26 no.5:649-650 S-O '64.
(MIRA 17:10)

1. Institut fizicheskoy khimii AN SSSR, Moskva.

S/0020/64/155/003/0644/0646

ACCESSION NR: AP4025113

AUTHOR: Deryagin, B. V. (Corresponding member); Kurgin, Yu. S.

TITLE: The unsteady evaporation of a liquid drop covered with an adsorption layer

SOURCE: AN SSSR. Doklady*, v. 155, no. 3, 1964, 644-646

TOPIC TAGS: monolayer, macroscopic film, liquid molecule, molecular diffusion, unsteady evaporation, drop evaporation, desorption, molecule transfer, adsorption equilibrium

ABSTRACT: A previous error in the treatment of the unsteady evaporation of a liquid drop through a monolayer led to an erroneous formula for the rate of non-steady evaporation (B. V. Deryagin et al., DAN, 135, (1960) 1717), and encouraged this report on the mentioned evaporation. Discussed in this connection is the unsteady evaporation of a liquid drop with a radius a covered with a monolayer of foreign matter and stationary in relation to an infinite gas medium. The assumption is made that the formation of an adsorption equilibrium is based on the formation of an adsorptive vapor layer on the surface of the monolayer of foreign matter. It is believed that the effect of the monolayer on evaporation may be the

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ACCESSION NR: AP4025113

result of the concentration effectiveness of evaporation reduced by a magnitude proportional to the resulting flow of molecules through the monolayer. This interperetation is somewhat analogous to Ohm's law. The proportionality factor can be treated as the resistance of the monolayer to evaporation, and the incomplete "adhesion" of the vapor molecules to the monolayer can be attributed to diffusion air resistance. Orig. art. has: 13 formulas.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR (Institute of Physical Chemistry, AN SSSR)

SUBMITTED: 02Jan64   /   DATE ACQ: 17Apr64   ENCL: 00

SUB CODE: CH   NO REF SOV: 002   OTHER: 000

Card 2/2

DERYAGIN, B.V.; YALAMOV, Yu.I.

Theory of the thermophoresis of moderately large aerosol
particles. Dokl. AN SSSR 155 no. 4:886-889 Ap '64. (MIRA 17:5)

1. Laboratoriya poverkhnostnykh yavleniy Instituta fizicheskoy
khimii AN SSSR. 2. Chlen-korrespondent AN SSSR (for Deryagin).

DERYAGIN, B.V., RABINOVICH, Ya.I.

Theory of thermophoresis of large aerosol particles checked
by experiment. Dokl. AN SSSR 157 no.1:154-157 Jl '64.
(MIRA 17:8)

1. Institut fizicheskoy khimii AN SSSR. 2. Chlen-korrespondent
AN SSSR (for Deryagin).

DERYAGIN, B.V.; YALAMOV, Yu.I.

Theory of thermomolecular pressure drop and thermotranspira-
tion (thermal osmosis) of gases in moderately wide capillaries.
Dokl. AN SSSR 157 no.4:940-943 Ag '64   (MIRA 17:8)

1. Institut fizicheskoy khimii AN SSSR. 2. Chlen-korrespondent
AN SSSR (for Deryagin).